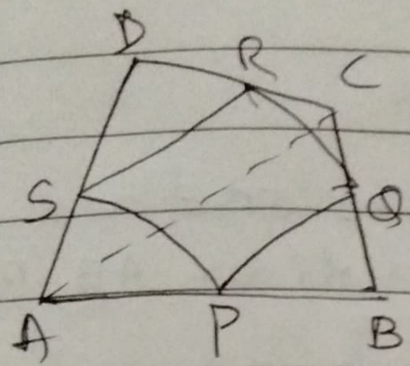
H.W.

Exercise → 8.2

28.9.21

Q1)



i) In ΔDAC,

R is the mid point of DC & S is the midpoint of DA.

Thus by mid point theorem, $SR \parallel AC$ & $SR = \frac{1}{2}AC$

ii) In ΔBAC,

P is the mid point of AB & Q is the midpoint of BC.

Thus by mid point theorem, $PQ \parallel AC$ &

$PQ = \frac{1}{2}AC$

Also, $SR = \frac{1}{2}AC$

PQ = SR

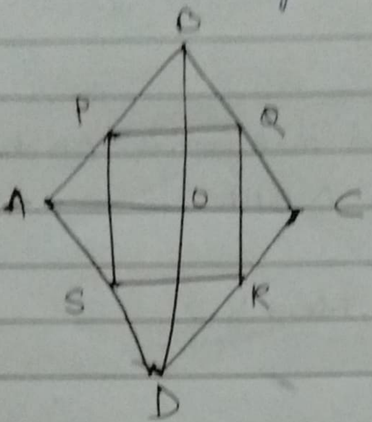
(ii) SR ∥ AC → from (i)

PQ ∥ AC → (ii)

⇒ ~~SR~~ PQ = SR

PQRS is a parallelogram.

Q2)



Given :- ABCD is a rhombus ~~and~~ and P, Q, R & S are the mid points of the sides AB, BC, CD & DA, respectively.

To prove :- PQRS is a rectangle.

Construction :-

Join AC & BD.

Proof :-

In $\triangle DRS$ & $\triangle BPQ$,

DS = BQ (Halves of the opposite sides of the rhombus.)

$\angle SDR = \angle QBP$ (opposite angles of the rhombus)

DR = BP (Halves of the opposite sides of the rhombus)

$\triangle DRS \cong \triangle BPQ$ (SAS congruency)

RS = PQ (CPCT) —— (i)

In $\triangle QCR$ & $\triangle SAP$

RC = PA (Halves of the opposite sides of the rhombus)

$\angle RCQ = \angle PAS$ (opposite angles of the rhombus)

CQ = AS (Halves of the opposite sides of rhombus)

$\triangle QCR \cong \triangle SAP$ (SAS congruency)

RQ = SP (CPCT) —— (ii)

Now,

In $\triangle CDB$,

R & Q are the midpoints of CD & BC respectively.

$\Rightarrow QR \parallel BD$

also,

P & S are the midpoints of AD & AB, respectively,

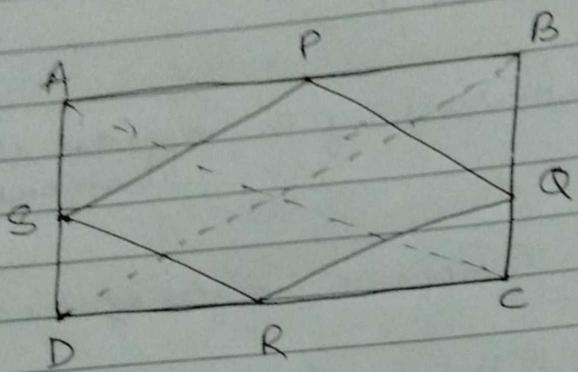
$\Rightarrow PS \parallel BD$

$\Rightarrow QR \parallel PS$

PQRS is a parallelogram.
also, $\angle PQR = 90^\circ$

Now,
In PQRS,
$RS = PQ$ & $RQ = SP$ from (i) & (ii)
$\angle Q = 90^\circ$
PQRS is a rectangle.

Q3)



Given:-
ABCD is a rectangle and P, Q, R & S are mid points of the sides AB, BC, CD & DA respectively.

construction:-

Join AC & BD.

To prove:-

PQRS is a rhombus.

Proof:-

In $\triangle ABC$
P & Q are the midpoints of AB & BC respectively.

$PQ \parallel AC$ & $PQ = \frac{1}{2}AC$ (Midpoint theorem) (i)

In ΔADC,

$SR \parallel AC$ & $SR = \frac{1}{2}AC$ (Midpoint theorem) (ii)

So, $PQ \parallel SR$ & $PQ = SR$

As in quadrilateral PQRS one pair of opposite sides is equal and parallel to each other, So, it is a parallelogram.

$PS \parallel QR$ & $PS = QR$ (opposite sides of parallelogram) (iii)

Now,

In ΔBCD,

Q & R are midpoints of side BC & CD respectively.

$QR \parallel BD$ & $QR = \frac{1}{2}BD$ (Midpoint theorem) (iv)

$AC = BD$ (Diagonals of a rectangle are equal) (v)

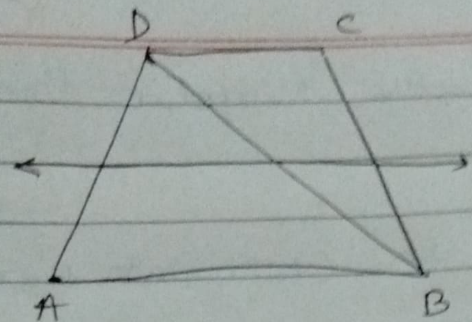
From equations (i), (ii), (iii), (iv) & (v)

$PQ = QR = SR = PS$

So, PQRS is a rhombus.

Hence proved!

Q4)



<u>Solution:-</u>

<u>Given that ;</u>

ABCD is a trapezium in which AB || DC, BD is a diagonal & E is the mid point of AD. A line is drawn through E parallel to AB. intersecting BC to F. Show that F is the mid point of BC.

<u>To prove:-</u>

F is the mid point of BC.

<u>Proof:-</u>

BD intersected EF at G.

In ΔBAD,

E is the mid point of AD & also EG || AB.

Thus, G is the midpoint of BD.
(converse of mid point theorem)

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Now,

In $\triangle BDC$,

G is the mid point of BD and also

$GF \parallel AB \parallel DC$

Thus, F is the midpoint of BC

(converse of mid point theorem)